

# Section 1.1

## Applications of Equations

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MATHS 103: Mathematics for Business I

# Manufacturing Firms

Notation:

- **Fixed Cost** is the cost that is independent of the level of production (it must be paid regardless of the production level). For example, the rent, insurance, etc.
- **Variable Cost** is the cost that is dependent on the level of production. For example, labor charge, material, electricity, etc.
- **Total Cost** is the sum of the fixed cost and the variable cost, i.e.,

$$\text{Total cost} = \text{fixed cost} + \text{variable cost}$$

- **Total revenue** is the money received for selling the product to the customer.

$$\text{Total Revenue} = (\text{price per unit})(\text{number of units sold})$$

- **Profit** is difference between the total revenue and the total cost.

$$\text{Profit} = \text{Total revenue} - \text{Total cost}$$

## Example

A bakery shop produces a cake which has variable cost per unit is 6 BD and a fixed cost is 800 BD. Each cake is sold for 10 BD. Find the number of cakes that must be sold to earn a profit of 600 BD?

Solution: Let the number of cakes that we are looking for is  $x$ . First we find the total revenue and the the total cost

$$\text{Total Revenue} = (\text{price per unit})(\text{number of units sold}) = 10x$$

$$\text{Total cost} = \text{fixed cost} + \text{variable cost} = 800 + 6x$$

$$\text{Profit} = \text{Total Revenue} - \text{Total Cost}$$

$$600 = 10x - (800 + 6x)$$

$$600 = 10x - 800 - 6x$$

$$600 + 800 = 4x$$

$$1400 = 4x$$

$$350 = x$$

## Exercise

A company produces gas at a variable cost for one unit is 82 BD per ton and the fixed cost is 120000 BD. Each unit is sold for 134 BD per ton. How many units must be sold in order to get a profit of 560000 BD?

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## Example

10000 BD has been invested into two accounts, saving (A) and super saving (B). The saving account pays 6% interest annually while the super saving pays 5% annually. At the end of the year, the account has 10570 BD. How much was invested in the saving account and how much was invested in the super saving account?

Solution: Suppose that  $x$  BD was invested in the saving account, so we have invested  $10000 - x$  in the super saving account.

After a year, the amount in the saving account which is  $x$  will yield 6% interest, so we get  $\frac{6}{100}x$  interest from the saving account.

The amount in the super saving account which is  $10000 - x$  will yield 5% interest, so we get  $\frac{5}{100}(10000 - x)$  interest from the super saving account.

Now the total interest we get after one year is  $10570 - 10000 = 570$  BD.

continue...

$$\frac{6}{100}x + \frac{5}{100}(10000 - x) = 570 \quad \text{refer to Section 0.7}$$

$$100\left(\frac{6}{100}x\right) + 100\left(\frac{5}{100}(10000 - x)\right) = 100(570)$$

$$6x + 5(10000 - x) = 57000$$

$$6x + 50000 - 5x = 57000$$

$$x + 50000 = 57000$$

$$x = 7000$$

So 7000 BD was invested in the saving account and 3000 BD was invested in the super saving account.

## Exercise

A person invested 1200000, part at an interest rate of 4% annually and the remaining at 5% annually. The total interest is equivalent to 4.5% of the total amount which is 1200000. How much was invested at each rate?

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